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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/520,277

04/06/2006

Sergueil Papernyi

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EXAMINER

BOLDA, ERIC L

ART UNIT

PAPER NUMBER

3663

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/520,277	<b>Applicant(s)</b> PAPERNYI ET AL.	
	<b>Examiner</b> ERIC BOLDA	<b>Art Unit</b> 3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16, 18, 20 and 21 is/are rejected.
- 7) ☒ Claim(s) 17 and 19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 January 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

## **DETAILED ACTION**

### ***Drawings***

1. Figures 1, 2, and 3, should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 1 and claims 2-13, 21 dependent on it are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims recite "means to provide substantially lower energy at two or more seed wavelengths" and "means to input energy form the primary pump source and energy at the two or more seed wavelengths" but it is not clear what is meant by energy; for a pump continuously providing energy, the relevant quantity would be *power* rather than *energy*. The Examiner has interpreted the claims as if the word "energy" is replaced by the word "power".

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 11, 14 and 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Papernyi (US 6,480,326) in view of Webb (US 6,163,396).

With regard to claims 1 and 14, Papernyi discloses in Fig. 8 a pump system for a Raman amplifier, comprising

- a primary pump source (6)
- means to provide lower power at two or more seed wavelengths (seed sources, (8), (9), (13) where these wavelengths are less than the primary pump source and differ by a Stokes (Raman ) shift from each other
- coupling means (14) (10) (11) and (7) to input the primary pump source and the two or more seed wavelengths to an optical transmission fiber (5)

The pump and seed source wavelengths are such that each is less by approximately a multiple  $n$  of Raman shifts from the signal wavelength in the optical transmission fiber.

(8<sup>th</sup> col. lines 30-42). Papernyi does not disclose that the system delivers power to a remote optically pumped amplifier (ROPA), the ROPA being spliced into the signal transmission fiber at a distance from either the transmitter end or the receiver end.

However, Webb teaches that a similar Raman pump system is suitable as a pump for a

Art Unit: 3663

ROPA (1<sup>st</sup> col. lines 5-8). Webb's system consists of a single pump coupled to a loop of fiber having Raman gain, resulting in light being converted to Stokes shifted wavelengths at the output (Abstract). As shown in Fig. 6, the output from the wavelength converter (50) is then spliced into the signal carrying fiber (42) at a distance from the transmitter or receiver (not shown), and the ROPA (40) is pumped by the output light. It would have been obvious to one skilled in the art (e. g. an optical engineer) to configure the apparatus of Papernyi, to pump a remote optical amplifier, because of the similar functioning of the Raman stimulated scattering process in converting pump light in the references, and as ROPA is specifically taught as an application by Webb (1<sup>st</sup> col. lines 5-8). The method recited in claim 14 is just the normal method of operation of the apparatus and is therefore obvious on the same grounds as the apparatus claim.

6. With regard to claims 11 and 18, Papernyi discloses in an alternative Fig. 6 that the seed source(9) includes reflector (19) to return into the pump delivery fiber amplified spontaneous Raman scattered radiation (9<sup>th</sup> col. lines 9-18).

7. Claims 2-9, 15-16, and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Papernyi in view of Webb as applied to claims 1 and 14 above, and further in view of Becker et al. "Erbium-Doped Fiber Amplifiers: Fundamentals and technology", Academic Press, San Diego (1999), pp. 346-348.

8. With regard to claims 2-7, 15 and 21, neither Papernyi nor Webb specifically disclose that the ROPA is a ROPA preamplifier, that the pump delivery fiber is the transmission (signal carrying fiber) linking the ROPA and the receiver end. However,

Art Unit: 3663

this configuration is shown in Fig. 9.24 (C) of Becker. Note that the amplifier is placed before the receiver and is therefore a preamplifier. A dedicated pump delivery fiber is shown in Fig. 9.24 (D)(line with arrow pointing left). Finally a means to couple light from the pump delivery fiber into the ROPA, in a co-propagating direction is shown in detail in Fig. 9.25; the coupler and pump reflector achieve this function. It would have been obvious to one skilled in the art (e. g. an optical engineer) to take the pump system of Papernyi, as a ROPA pump system in Webb, and configure it as taught by Becker for the advantage of avoiding powered cable (p. 346, 2<sup>nd</sup> para.). With regard to claims 5, 15, and 21, the wavelengths of the seed source are selected to flatten the distributed Raman gain profile (Papernyi 6<sup>th</sup> col. lines lines 27-31). With regard to claim 7, diode lasers as a pump source are disclosed (Papernyi 7<sup>th</sup> col. lines 27-32).

9. With regard to claims 8, 9 and 16, Becker teaches in the left side ig. (D) a configuration that the ROPA is a post-amplifier and the pump delivery is a dedicated pump delivery fiber. The pump light is coupled into the ROPA fiber in both coproagating and counterpropagating direction with respect to the signal.

10. With regard to claims 13 and 20, it is notoriously well-known in the art of optical engineering to choose wavelengths of pumps and seed sources so as to avoid the water absorption peak in an optical fiber; the Examiner takes Official Notice of this fact. If applicant does not traverse the assertion of the Examiner's assertion of Official Notice or applicant's traverse is not adequate, this statement of well-known fact will taken to be admitted prior art, otherwise a reference will be supplied as evidence. See MPEP 2144.03.

***Allowable Subject Matter***

11. Claims 10 and 12 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

12. Claim 17 and 19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Stentz, Islam et al, Strutz et al, Kukenskov, and Korolev.

14. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Eric Bolda whose telephone number is 571-272-8104. The examiner can normally be reached on M-F from 8:30am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Jack Keith, can be reached on 571-272-6878. Please note the fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

Art Unit: 3663

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Eric Bolda/

Examiner, Art Unit 3663